

Claims:

1. An acid addition salt of 5-aminolevulinic acid (5-ALA) or of a 5-ALA derivative (e.g. a 5-ALA ester) with an acid which has a pKa of about 5 or less, preferably about 3 or less, with the proviso that the acid is other than hydrochloric acid.

2. An acid addition salt as claimed in claim 1 which is derived from a compound of formula X:



(wherein R^1 and R^2 each independently represents a hydrogen atom or an optionally substituted straight-chained, branched or cyclic alkyl group which may optionally be interrupted by one or more -O-, -NR³-, -S- or -PR³- groups; and R^3 is a hydrogen atom or a C₁₋₆ alkyl group).

3. An acid addition salt as claimed in claim 2, wherein in formula X, R^1 either represents an unsubstituted alkyl group (e.g. C₁₋₆ alkyl) or an alkyl group (e.g. C₁₋₂ alkyl) substituted by an aryl group (e.g. phenyl) and/or each R^2 represents a hydrogen atom.

4. An acid addition salt as claimed in claim 2 or claim 3, wherein R^1 is a benzyl or substituted benzyl group.

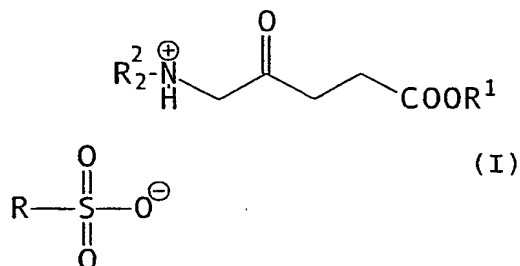
5. An acid addition salt as claimed in claim 2, wherein said compound of formula X is 5-ALA, 5-ALA methyl ester, 5-ALA hexyl ester, 5-ALA benzyl ester, 5-ALA 2-methylpentyl ester, 5-ALA 4-methylpentyl ester, 5-ALA 2-(2-ethoxyethoxy)ethyl ester, 5-ALA 4-methylbenzyl ester or 5-ALA 4-isopropylbenzyl ester.

6. An acid addition salt as claimed in claim 2, wherein said compound of formula X is 5-ALA, 5-ALA methyl ester, 5-ALA hexyl ester or 5-ALA benzyl ester.

7. An acid addition salt as claimed in any one of claims 1 to 6, wherein said acid is an organic acid.

8. An acid addition salt as claimed in claim 7, wherein said acid is a sulfonic acid or a sulfonic acid derivative.

9. An acid addition salt as claimed in claim 1 of formula I:



(wherein

R is a hydrogen atom or an optionally substituted alkyl (e.g. a C₁₋₂₀ alkyl group) or aryl group (e.g. an aryl group of up to 20 carbon atoms), preferably an optionally substituted alkyl or aryl group;

R¹ and R² each independently represents a hydrogen atom or an optionally substituted straight-chained, branched or cyclic alkyl group which may optionally be interrupted by one or more -O-, -NR³-, -S- or -PR³- groups; and

R³ is a hydrogen atom or a C₁₋₆ alkyl group).

10. An acid addition salt as claimed in claim 9, wherein R is optionally substituted phenyl or methyl.

11. An acid addition salt as claimed in claim 9 or claim 10, wherein in formula I, R¹ either represents an

unsubstituted alkyl group (e.g. C₁₋₆ alkyl) or an alkyl group (e.g. C₁₋₂ alkyl) substituted by an aryl group (e.g. phenyl) and/or each R² represents a hydrogen atom.

12. An acid addition salt as claimed in any one of claims 9 to 11, wherein R¹ is a benzyl or substituted benzyl group.

13. An acid addition salt as claimed in claim 9 which is a sulfonic acid addition salt of 5-ALA, 5-ALA methyl ester, 5-ALA hexyl ester, 5-ALA benzyl ester, 5-ALA 2-methylpentyl ester, 5-ALA 4-methylpentyl ester, 5-ALA 2-(2-ethoxyethoxy)ethyl ester, 5-ALA 4-methylbenzyl ester or 5-ALA 4-isopropylbenzyl ester.

14. An acid addition salt as claimed in claim 9 which is a sulfonic acid addition salt of 5-ALA, 5-ALA methyl ester, 5-ALA hexyl ester or 5-ALA benzyl ester.

15. An acid addition salt as claimed in claim 13 or claim 14, wherein said acid is naphthalene-1,5-disulfonic acid, ethane-1,2-disulfonic acid, p-toluenesulfonic acid, methanesulfonic acid, dodecylsulfonic acid, naphthalene-2-sulfonic acid, benzenesulfonic acid, 2-hydroxy-ethanesulfonic acid, ethanesulfonic acid, or (+)-camphor-10-sulfonic acid.

16. An acid addition salt as claimed in any one of claims 1 to 7, wherein said acid is cyclamic acid, thiocyanic acid, oxalic acid, 2,2-dichloroacetic acid, glycerophosphoric acid, L-aspartic acid, maleic acid, glutamic acid, alginic acid, pantoic acid, 2-oxo-glutaric acid, 1-hydroxy-2-naphthoic acid, malonic acid, gentisic acid, salicylic acid or tartaric acid.

17. An acid addition salt as claimed in any one of claims 1 to 6, wherein said acid is an inorganic acid.

18. An acid addition salt as claimed in claim 17, wherein said acid is hydrobromic acid, sulfuric acid, nitric acid or phosphoric acid, preferably nitric acid.

19. An acid addition salt as claimed in any one of claims 1 to 6, wherein said acid is a sulfonic acid, a sulfonic acid derivative or nitric acid.

20. An acid addition salt as claimed in any preceding claim, wherein said acid is pharmaceutically acceptable.

21. A process for preparing an acid addition salt as claimed in any one of claims 1 to 20, said process comprising reacting 5-aminolevulinic acid or a derivative thereof (e.g. an ALA ester) with an acid.

22. A process for the preparation of an acid addition salt as claimed in any one of claims 1 to 20, said process comprising the reaction of 5-aminolevulinic acid, or an esterifiable derivative thereof, with an alkanol or an ester-forming derivative thereof (e.g. with an alkanol) in the presence of an acid.

23. A process for the preparation of an acid addition salt as claimed in any one of claims 1 to 20 (e.g. a compound of formula I), said process comprising:

(i) contacting a solution comprising a hydrochloride salt of ALA or of an ALA derivative (e.g. a compound of the formula $\text{Cl}^- \text{R}^2\text{N}^+\text{H}-\text{CH}_2\text{COCH}_2\text{CH}_2\text{CO}_2\text{R}^1$ wherein R^1 and R^2 are as defined in claim 2) with a basic anion exchange resin;

(ii) optionally removing said resin; and

(iii) mixing the resulting solution with a solution comprising an acid, preferably a sulfonic acid or a sulfonic acid derivative.

24. A process for the preparation of an acid addition salt as claimed in any one of claims 1 to 20 (e.g. a compound of formula I), said process comprising:

- (i) reacting a hydrochloride salt of ALA or of an ALA derivative (e.g. a compound of the formula $\text{Cl}^- \text{R}^2 \text{N}^+ \text{H} - \text{CH}_2 \text{COCH}_2 \text{CH}_2 \text{CO}_2 \text{R}^1$ wherein R^1 and R^2 are as defined in claim 2) with a silver salt of an acid, preferably a sulfonic acid or a sulfonic acid derivative, in a solvent in which AgCl is substantially insoluble; and
- (ii) optionally separating AgCl from the resulting salt.

25. An acid addition salt obtainable by contacting (e.g. reacting) 5-aminolevulinic acid (5-ALA) or a 5-ALA derivative (e.g. a 5-ALA ester) with an acid which has a pK_a of about 5 or less, preferably about 3 or less, with the proviso that the acid is other than hydrochloric acid.

26. A acid addition salt obtainable by a process as claimed in any one of claims 21 to 24.

27. A pharmaceutical composition comprising an acid addition salt as claimed in any one of claims 1 to 20, 25 or 26, together with at least one pharmaceutical carrier or excipient.

28. An acid addition salt or composition as claimed in any one of claims 1 to 20, 25 or 26 for use as a medicament, e.g. for use in photodynamic therapy.

29. Use of an acid addition salt as claimed in any one of claims 1 to 20, 25 or 26 for the preparation of a therapeutic agent for use in photochemotherapy, preferably for the treatment of disorders or abnormalities of external or internal surfaces of the body which are responsive to photochemotherapy.

30. A method of photochemotherapeutic treatment of disorders or abnormalities of external or internal surfaces of the body, said method comprising administering to the affected surfaces, an acid addition salt or composition as claimed in any one of claims 1 to 20, 25 or 26, and exposing said surfaces to light (e.g. white light), preferably to light in the wavelength region 300-800 nm (e.g. blue light in the wavelength region 380-440 nm).

31. A product comprising an acid addition salt as claimed in any one of claims 1 to 20, 25 or 26, together with at least one surface-penetration assisting agent, and optionally one or more chelating agents as a combined preparation for simultaneous, separate or sequential use in treating disorders or abnormalities of external or internal surfaces of the body which are responsive to photochemotherapy.

32. A kit for use in photochemotherapy of disorders or abnormalities of external or internal surfaces of the body comprising:

- a) a first container containing an acid addition salt as claimed in any one of claims 1 to 20, 25 or 26,
- b) a second container containing at least one surface penetration assisting agent; and optionally
- c) one or more chelating agents contained either within said first container or in a third container.

33. A method of *in vitro* diagnosis of abnormalities or disorders by assaying a sample of body fluid or tissue of a patient, said method comprising at least the following steps:

- i) admixing said body fluid or tissue with an acid addition salt as claimed in any one of claims

- 1 to 20, 25 or 26,
- ii) exposing said mixture to light,
- iii) ascertaining the level of fluorescence, and
- iv) comparing the level of fluorescence to control levels.